

REMARKS

The Office Action mailed December 17, 2001, has been received and reviewed. Claims 19, 21 through 23, and 25 through 34 are currently pending in the application. Claims 19, 21 through 23, and 25 through 34 stand rejected. Applicant has amended claims 21, 22, 30 and 34 herein. Applicant respectfully requests reconsideration of the application in light of the arguments set forth below.

35 U.S.C. § 102(b) Anticipation Rejections

Anticipation Rejection Based on Japanese Patent No. 5-13665 to Yamauchi

Claim 19 stands rejected under 35 U.S.C. § 102(b) as being anticipated by Yamauchi (Japanese Patent No. 5-13665). Applicant respectfully traverses this rejection, as hereinafter set forth.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Claim 19 of the presently claimed invention is directed to a method of fabricating a multi-die assembly. The method includes, providing a substrate including a plurality of conductors; attaching at least one active face-down base die to said substrate in electrical communication with at least some of said plurality of conductors; securing the back side of at least one active face-up stack die to said at least one base die with *electrically conductive adhesive*; electrically connecting said at least one stack die to at least one of said conductors; and *electrically grounding* said at least one base die *via said electrically conductive adhesive and said at least one stack die*.

Yamauchi discloses two TAB chips "joined with an adhesive 7 with end faces having no bump 3 faced each other. The bumps are located on an upper and a lower end face of the TAB

chip laminate body 2.... [T]he bumps 3 of the upper TAB chip 2 are connected with one end of wire leads 6 and the other end of the wire leads is joined to a pad of the printed board 1.”

(Yamauchi, Constitution). Applicants submit that Yamauchi fails to teach that the adhesive utilized be an electrically conductive adhesive. Further, Yamauchi fails to teach that a face-down base die be electrically grounded via the electrically conductive adhesive and the at least one stack die.

Applicant, therefore, submits that claim 19 is clearly not anticipated by Yamauchi and respectfully requests reconsideration and allowance thereof.

35 U.S.C. § 103(a) Obviousness Rejections

Obviousness Rejection Based on Japanese Patent No. 5-13665 to Yamauchi in View of U.S. Patent No. 5,399,898 to Rostoker

Claims 23, 25, and 30 through 32 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamauchi (Japanese Patent No. 5-13665) in view of Rostoker (U.S. Patent No. 5,399,898). Applicant respectfully traverses this rejection, as hereinafter set forth.

M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, **the prior art reference (or references when combined) must teach or suggest all the claim limitations.** The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (Emphasis added).

The 35 U.S.C. § 103(a) obviousness rejections of claims 23, 25, and 30 through 32 are improper because the references fail to teach or suggest all of the claim limitations. Further, there is a lack of motivation to combine the references.

Claims 23 and 25

Claim 23 depends directly from independent claim 19 and claim 25 depends from claim 23. Claim 23 introduces the additional subject matter of securing at least another stack die to said assembly, and electrically connecting said at least another stack die and at least one of said plurality of substrate conductors. Claim 25 further introduces the subject matter of securing said at least another stack die to said at least one stack die.

As set forth above, Yamauchi fails to teach or suggest all of the limitations set forth in independent claim 19. Particularly, Yamauchi fails to teach or suggest the use of an electrically conductive adhesive to secure the back side of a face-up stack die with a face-down base die. Further, Yamauchi fails to teach or suggest that the face-down base die be electrically grounded via the electrically conductive adhesive and the at least one stack die.

Applicants further submit that Rostoker likewise fails to teach or suggest the use of electrically conductive adhesive for securing the back side of a face-up stack die with a face-down base die. Nor does Rostoker teach or suggest the grounding of the face-down base die via the electrically conductive adhesive and a face-up stack die which is secured thereto.

Further, Applicant submits that there is a lack of motivation to combine Yamauchi with Rostoker. Rostoker discloses numerous embodiments of multi-chip semiconductor arrangements using flip-chip dies. However, considering each of the embodiments disclosed, Applicant submits that Rostoker fails to contemplate a “back-to-back” type arrangement of stacked semiconductor die. Rather, each of the embodiments appear to be directed to semiconductor dies stacked in a “face-to-face” arrangement or, in other words, with active surfaces facing each other. Applicant submits that the Examiner has not provided sufficient motivation for combining Yamauchi with Rostoker as one is directed to “back-to-back” arrangements wherein two chips are secured using adhesive, while the other is directed to “face-to-face” arrangements wherein the chips are secured by way of their electrical connections.

Applicants, therefore, submit that claims 23 and 25 are clearly allowable over Yamauchi and Rostoker, either considered alone or in combination, and respectfully request reconsideration and allowance of the same.

Claims 30 through 32

Claim 30 depends directly from independent claim 19, claim 31 depends from claim 30 and claim 32 depends from claim 31. Claim 30 introduces the additional subject matter of attaching at least two active face-down base die to said substrate and electrically coupling each of said at least two base die with at least one of said plurality of substrate conductors. Claim 31 introduces the subject matter of bridging said at least one stack die between said at least two base die. Claim 32 introduces the subject matter of securing at least another stack die over said at least one stack die.

As set forth above, neither Yamauchi nor Rostoker teach or suggest all of the limitations of claim 19. Particularly, neither of the references relied upon teach or suggest the use of electrically conductive adhesive for securing the back side of a face-up stack die with a face-down base die. Nor do the references teach or suggest the grounding of the face-down base die via the electrically conductive adhesive and the face-up stack die which is secured thereto.

Additionally, as set forth above, Applicant submits that there is a lack of motivation to combine Yamauchi with Rostoker as one is directed to “back-to-back” arrangements wherein two chips are secured using adhesive, while the other is directed to “face-to-face” arrangements wherein the chips are secured by way of their electrical connections.

Further, with respect to claims 31 and 32, while the Examiner points to FIG. 4A of Rostoker as teaching the subject matter of bridging two base die with a stack die, Applicant submits that one of ordinary skill in the art would lack motivation to combine such a teaching with Yamauchi. Rostoker explicitly states that such an embodiment requires increased substrate surface area (see col. 15, lines 9-11) thereby teaching away from Yamauchi which states that its disclosed arrangement is desirable because it substantially *reduces* mounting area.

Applicant, therefore, submits that claims 30 through 32 are clearly allowable over Yamauchi and Rostoker, either taken individually or in combination, and respectfully requests reconsideration and allowance thereof.

Obviousness Rejection Based on Japanese Patent No. 5-13665 to Yamauchi in View of U.S. Patent No. 5,399,898 to Rostoker and Further in View of U.S. Patent No. 5,323,060 to Fogal et al.

Claims 21, 22, 26 through 29, 33, and 34 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamauchi (Japanese Patent No. 5-13665) in view of Rostoker (U.S. Patent No. 5,399,898) and further in view of Fogal et al. (U.S. Patent No. 5,323,060). Applicant respectfully traverses this rejection, as hereinafter set forth.

Claims 21 and 22

Claim 21 depends directly from independent claim 19 and claim 22 depends from claim 21. Claim 21 introduces the additional subject matter of securing at least one discrete component to at least one of said at least one stack die, said at least one base die, and said substrate; electrically connecting said at least one discrete component to at least one of said stack die, said base die, and said substrate; and extending a die-to-component bond wire between said at least one stack die and said at least one discrete component. Claim 22 further introduces the subject matter of extending a component-to-substrate bond wire between said at least one discrete component and at least one of said plurality of substrate conductors.

As noted above, both Yamauchi and Rostoker fail to teach or suggest the use of electrically conductive adhesive for securing the back side of a face-up stack die with a face-down base die. Nor do the references teach or suggest the grounding of the face-down base die via the electrically conductive adhesive and the face-up stack die which is secured thereto. Applicant further submits that Fogal fails to teach or suggest such subject matter.

Furthermore, Applicant submits that there is a lack of motivation to combine the teachings of the references relied upon by the Examiner as one reference teaches back-to-back arrangements of semiconductor dies, another teaches face-to-face arrangements of semiconductor dies, and the last teaches face-to-back arrangements of semiconductor dies with no apparent suggestion in any of such references that the teachings of one are applicable to the others.

Applicant, therefore submits that claims 21 and 22 are clearly allowable over Yamauchi, Rostoker and Fogal, either taken individually or in combination, and respectfully requests reconsideration and allowance thereof.

Claims 26 through 29

Each of claims 26 through 29 depend directly from claim 25 which, in turn, depends from independent claim 19.

Claim 26 introduces the additional subject matter of securing at least one discrete component to said at least one stack die; and extending a die-to-component bond wire between said at least another stack die and said at least one discrete component.

Claim 27 introduces the additional subject matter of securing at least one discrete component to said at least one stack die; and extending a component-to-substrate bond wire between said at least one discrete component and at least one of said plurality of substrate conductors.

Claim 28 introduces the additional subject matter of securing at least one discrete component to said at least one base die; and extending a die-to-component bond wire between said at least another stack die and said at least one discrete component.

Claim 29 introduces the additional subject matter of securing at least one discrete component to said at least one base die; and extending a component-to-substrate bond wire between said at least one discrete component and at least one of said plurality of substrate conductors.

As set forth above, the combined references of Yamauchi, Rostoker and Fogal fail to teach or suggest the use of electrically conductive adhesive for securing the back side of a face-up stack die with a face-down base die. Nor do the references relied upon teach or suggest the grounding of the face-down base die via the electrically conductive adhesive and the face-up stack die which is secured thereto.

Furthermore, as set forth above, Applicant submits that there is a lack of motivation to combine the references in the manner set forth by the Examiner.

Applicant, therefore, submits that claims 26 through 29 are clearly allowable over Yamauchi, Rostoker and Fogal, either taken individually or in combination, and respectfully requests reconsideration and allowance thereof.

Claims 33 and 34

Claim 33 depends directly from independent claim 19 and claim 34 depends from claim 33. Claim 33 introduces the additional subject matter of securing at least one discrete component to said substrate; and extending a die-to-component bond wire between said at least one stack die and said at least one discrete component. Claim 34 introduces the subject matter of securing at least another discrete component to said substrate; and extending a die-to-component bond wire between said at least one stack die and said at least another discrete component.

As set forth above, the combined references of Yamauchi, Rostoker and Fogal fail to teach or suggest the use of electrically conductive adhesive for securing the back side of a face-up stack die with a face-down base die. Nor do the references relied upon teach or suggest the grounding of the face-down base die via the electrically conductive adhesive and the face-up stack die which is secured thereto.

Furthermore, as set forth above, Applicant submits that there is a lack of motivation to combine the references in the manner set forth by the Examiner.

Applicant, therefore, submits that claims 33 and 34 are clearly allowable over Yamauchi, Rostoker and Fogal, either taken individually or in combination, and respectfully requests reconsideration and allowance thereof.

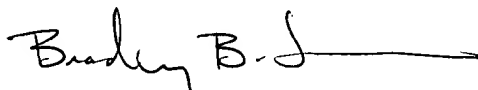
ENTRY OF AMENDMENTS

The amendments to claims 21, 22, 30 and 34 above should be entered by the Examiner because the amendments are supported by the as-filed specification and drawings and do not add any new matter to the application.

CONCLUSION

Claims 19, 21 through 23, and 25 through 34 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, he is respectfully invited to contact Applicant's undersigned attorney.

Respectfully Submitted,



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Enclosure: Version With Markings to Show Changes Made

VERSION WITH MARKINGS TO SHOW CHANGES MADE

21. (Three Times Amended) The method of claim 19, further comprising:
securing at least one discrete component to at least one of said at least one stack die, said at least one base die, and said substrate;
electrically connecting said at least one discrete component to at least one of said stack die, said base die, and said substrate; and
extending a die-to-component bond wire between said at least one stack die and said at least one discrete component.

22. (Three Times Amended) The method of claim [19] 21, further comprising:
extending a component-to-substrate bond wire between said at least one discrete component and at least one of said plurality of substrate conductors.

30. (Three Times Amended) The method of claim 19, wherein the attaching [ate] at
least one active face-down base die includes attaching at least two active face-down base die to said substrate and electrically coupling each of said at least two base die with at least one of said plurality of substrate conductors.

34. (Three Times Amended) The method of claim [31] 33, further comprising:
securing at least another discrete component to said substrate; and
extending a die-to-component bond wire between said at least one stack die and said at least another discrete component.